



# ***Soldier Systems***

## ***Nanoscience for the Soldier Workshop***

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**Bill Brower  
APM Future Soldier  
Office of PM-Soldier Systems  
Telephone: (703) 704-2888  
[wbrower@pmsoldier.belvoir.army.mil](mailto:wbrower@pmsoldier.belvoir.army.mil)**

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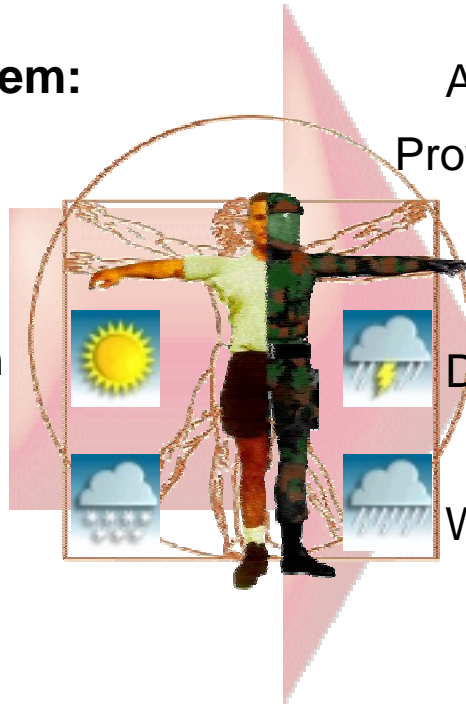


# ***The Soldier System***

## **Definition**

A *Fully* Integrated Soldier System:

- Trained and Ready Soldier
- Equipped For Operational Environments
- Enhance Lethality Through Electronic Battlefield
- Seamlessly Integrated With Other Soldiers & Their Weapon Systems



## **Vision**

A Fully Integrated Soldier System  
Providing Combat Overmatch  
Tailorable for All Soldiers  
In Full Spectrum Conflict  
During Joint  
And Coalition Operations  
Within A Soldier Support  
Architecture

**A Focused Effort on The Soldier as a System**



## ***Land Warrior***

### **Integration of Infantry Soldier Combat Capabilities into a Warfighting System Optimized for Close Combat**

#### **Capabilities:**

- **Command & Control**
- **Survivability**
- **Situational Awareness**
- **Lethality**
- **Mobility**
- **Training**







# ***The Land Warrior System*** ***(A Fully Integrated Soldier System)***

## **Integrated Helmet Assembly**

Lightweight Helmet with Mounted Display, Laser Detector and Ballistic/Laser Eye Protection

## **Computer/Radio Subsystem**

Pentium Computer, Soldier and Squad Radios, Navigation & Handheld Flat Panel Display

## **Software Subsystem**

Modular, Tactical & Mission Software, Designed Avoid Information Overload

## **Weapon System**

Modular Design allows for Mounting of Video Camera, Thermal Weapons Sight, Close Combat Optics & Laser Rangefinder

## **Protective Clothing and Individual Equipment Subsystem**

Modular Lightweight Load Carrying Equipment, INTERCEPTOR Body Armor, Chem/Bio



**“The First System To Provide Overmatch Capability For Ground Soldiers”**



# ***Land Warrior V0.6 Configuration (1 of 2)***

## **Integrated Helmet Assembly**

- Light Weight Assault Helmet
- Color Display
- Image Intensification w/Display for Night Operations
- Audio System



## **Weapon System**

- M4 Modular Weapon System
- Thermal Sight
- Daylight Video Sight
- Close Combat Optic
- Lasers
- Wiring Harnesses/Cabling (Hybrid)
- Other Existing Weapon & Accessories

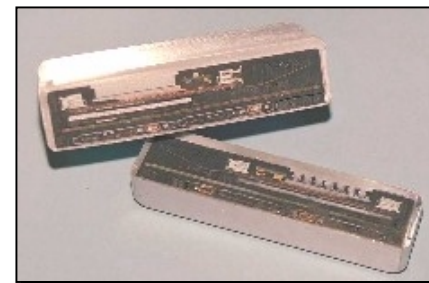




# ***Land Warrior V0.6 Configuration (2 of 2)***

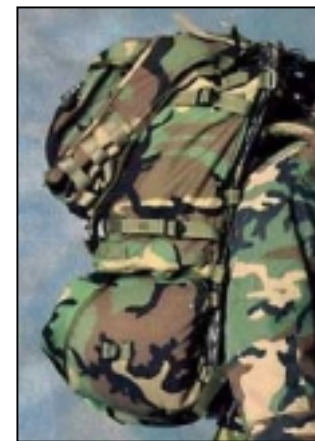
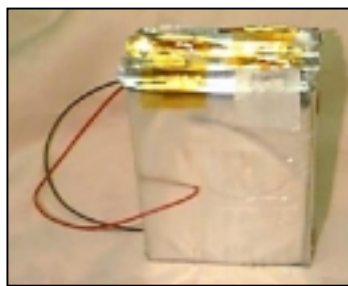
## **Computer/Radio Subsystem**

- Computer
- PCMCIA Soldier Radio
- GPS
- Integrated Navigation
- Handheld Flat Panel Display
- Keyboard



## **Protective Clothing & Individual Equipment Subsystem**

- MOLLE
- Interceptor Body Armor
- Pouch Cell Batteries
- Other Existing CIE



## **Software Subsystem**

- Software







# Land Warrior (JCF-AWE Exercise)



News lines The Army

## WE'LL TAKE IT

### Land Warrior gives platoon big advantage in field test

By Matthew Cox  
computer system can give its users the same-field advantage even on an unfamiliar battlefield.

Armed with the latest version of the Army's Land Warrior, a platoon of soldiers from the 3rd Airborne Division parachuted into Fort Polk on Sept. 8 to assess its performance when matched against a highly trained opponent at the Joint Simulation Training Center.

The exercise was part of the Joint Contingency Force Advanced Warfare Experiment designed to evaluate how a number of new technologies might affect the way forces fight in the future.

The experiment, scheduled to run through Sept. 11, involves more than 4,000 soldiers from the 3rd, 10th Mountain and 4th Infantry (Mechanized) divisions as well as a company of Marines.

#### Keeping in touch

Despite heavy rains and high humidity, Land Warrior's movement and battle positioning satellite system enabled every soldier in 3rd Platoon, C Company, 3rd Battalion, 325th Airborne Infantry Regiment to acquire targets, navigate with precision over foreign terrain and remain in constant contact with leaders during the intensive week of fire-on-fire and live-fire operations.

"It's an enormous achievement," said program director Col. Bruce Jett. "So far, the system has met and demonstrated all that we expected it to."

Jett had reason to be upbeat. The successful test comes just two years after early system failures forced a complete program overhaul.

Land Warrior's newest prototype



Photo by The Associated Press

Sgt. Mark Brown, 325th Airborne, adjusts his indirect-mounted Land Warrior view screen. The high-tech system got positive reviews during its first operational test.

types were delivered June 5 to Fort Bragg, N.C. Since then, the platoon of paratroopers has been working closely with engineers to become proficient with the system while identifying areas that need improvement.

They learned how to access maps and graphics, locate each other and communicate using voice and infrared messaging features. While often frustrating, the tedious training appeared to pay off quickly after the Land

Warrior platoon hit the drop zone as part of 3rd Battalion's mission of the exercise. Leading the assembly area at night often is a time-consuming task for paratroopers, who must first determine their location by

using a map and terrain assessment. But for soldiers armed with Land Warrior, the task proved surprisingly simple.

Once the system was upgraded and loaded up, each soldier saw the heading display in the eyepiece to access a pre-loaded map of the area. On it, each soldier's location was marked, so they could all walk directly to the assembly point.

"Approximately 40 minutes after we were alerted to the drop,"

One squad was delayed after coming into contact with a sniper from the 1st Battalion (Airborne), 101st Infantry Regiment, (ARVN) opposing force unit, one after landing.

"The first about five shots and those were down," recalled Sgt. Anthony Roman. "He was a good shot." The exercise participants used laser integrated rifle and systems to simulate actual live fire.

Roman said he was able to see Land Warrior to locate his squad leader's position on the drop zone and call for help.

"I was able to talk to my squad leader and bring him into my position," he said. "When he did come over the hill, I knew it was him and not the enemy."

#### Killing sniper at 300 meters

But before help could arrive, Sgt. Chad Lennan took advantage of the thermal weapons sight mounted on his M4 carbine to clearly detect the sniper. He then "killed" the sniper at a distance of 300 meters — a feat he said would have been impossible against a well-trained sniper without Land Warrior.

"There is no way I would have been able to engage him at that distance," Lennan said. "We had no guys with us. I think we would have all died if we had tried to take out a sniper at that distance across an open field."

Lennan then continued his responsive fire, until Roman and a fellow soldier overtook the sniper's position. Throughout the exercise, the battalion commander said he was impressed at how the Land Warrior system took the guesswork out of live navigation. That meant the platoon





## **SA/C4I**

- Common Tactical Picture
- Map Displays
- Over-the-air Map Data Report
- Graphics, Orders, and Receipts
- Secure Voice & Digital Comms
- Power Management
- Image Capture, Transmission, and Receipt
- **ABCS Interoperability**
- Checklist Functions
- Mission Data Store
- Mission Planned Enhancement

## **Survivability**

- Interceptor Body Armor
- Engage Targets From Cover
- Fratricide Avoidance SA.
- Integrated Combat ID
- Logistically Supportable



Denotes KPPs

# ***Land Warrior V1.0 Functionality***

## **Sustainability**

- **12 Mission Hours with 2.0 Pound Battery**
- Water Immersion, Parachuting
- Full Temp Range

## **Lethality**

- Target Acquisition & Engagement
- Accurate Target Locations
- Multi-Function Laser

## **Mobility**

- GPS – Integrated Navigation
- **Decreased Weight Over Current Soldier Load**
- Modular, Tailorable Loading

**Full Connectivity, Full Tested, Fully Supported**





# ***Land Warrior Now What?***

**ocus is on Version 1.0 and Testing**

**developmental Testing**

**initial Operational Test & Evaluation  
Company Level**

**accelerating Testing for Milestone III**

**consortium of Contractors to Build Version 1.0**

- Incorporating a Production Company to Ensure Producibility**
- Overall Same Design as Version 0.6 but Upgraded**





# ***Land Warrior Requirements for Weight and Power***

**Dec 00 ORD**

Time Phase	Threshold/KPP		Objective	
	Weight	Power	Weight	Power
Initial Prod (IP)	92.6 lbs	12 Hours 2.0 lbs max	83.3 lbs	24 Hours 2.0 lbs max
IP + 2.5 Years	No Increase	24 Hours	No Increase	48 Hours
IP + 6 Years	83.3 lbs	48 Hours	83.3 lbs	96 Hours
IP + 10 Years	66.7 lbs	96 Hours	66.7 lbs	144 Hours

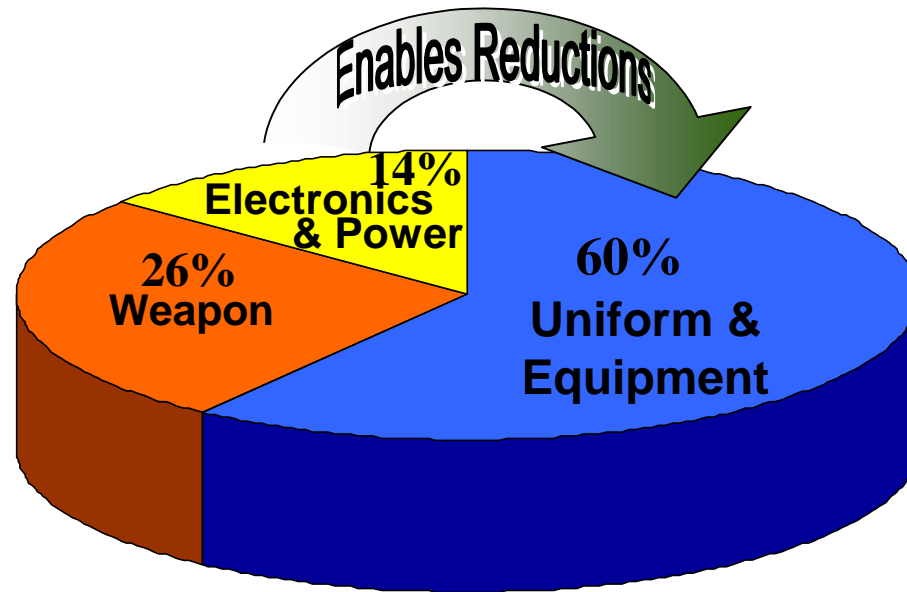
Note: Hours are Mission Hours

**Decreasing Weight – Increasing Mission Duration**



# ***Soldier Systems Weight Distribution Combat Load***

92.6 lbs is  
Current Soldier  
Combat Load



<b>Electronics</b>	<b>– 13 Lbs.</b>	
<b>Uniform/ Equip</b>	<b>– 55 Lbs.</b>	
<b>Weapon</b>	<b>– 24 Lbs.</b>	} 79 Lbs.
	<u>92 Lbs.</u>	

**Without Electronics The Soldier Still Carries 79 Lbs!**





# ***How Can Nanoscience Help This Soldier?***

## ***Some Thoughts***

Priority is to Reduce the Soldier's Load

- **Light Weight High Durability Fabrics**
  - Uniform
  - Packs
- **Light Weight Materials**
  - Ruck Frame
  - Bayonet
  - Rifle/Ammo
  - Tools



- **Reduced Weight Ballistic Protection**
  - Small Arms Plates
  - Fragmentation Vest
- **Laser Eye Protection**

Sustainment Load Plus Distribution of Company Load  
Results in Soldier Loads of 120-145 Pounds or More



# ***How Can Nanoscience Help This Soldier?***

## ***Some Thoughts***

Previous Plus the Following

- **Next Generation Displays**
  - Ultra Thin High Resolution
- **Information Processing & Storage**
  - Small Massive Durable Storage Devices
  - Distributed Micro Processors
  - Conductive Fibers Embedded in Fabric



- **Artificial Muscles**
  - Actuators for Increased Human Performance
- **Power Storage/Energy Generation**
  - Harvest Energy from Fabric Flexure
  - Hydrogen Storage
  - Embedded Flexible Batteries
- **Drug and Nutrient Delivery on Demand**

**Technology Must Be Affordable**

## *Summary*



- Land Warrior Version 0.6 Proved Successful at JCF AWE
- Focus is now on Version 1.0 Land Warrior
  - Developmental Testing 4QFY01-4QFY02
  - IOT&E FY03
  - Milestone III FY03
- Nanoscience has the potential to provide substantial benefits to the Soldier – Need to Mature Technology
- Soldier Technology must be affordable
  - Large acquisition objective quantities

